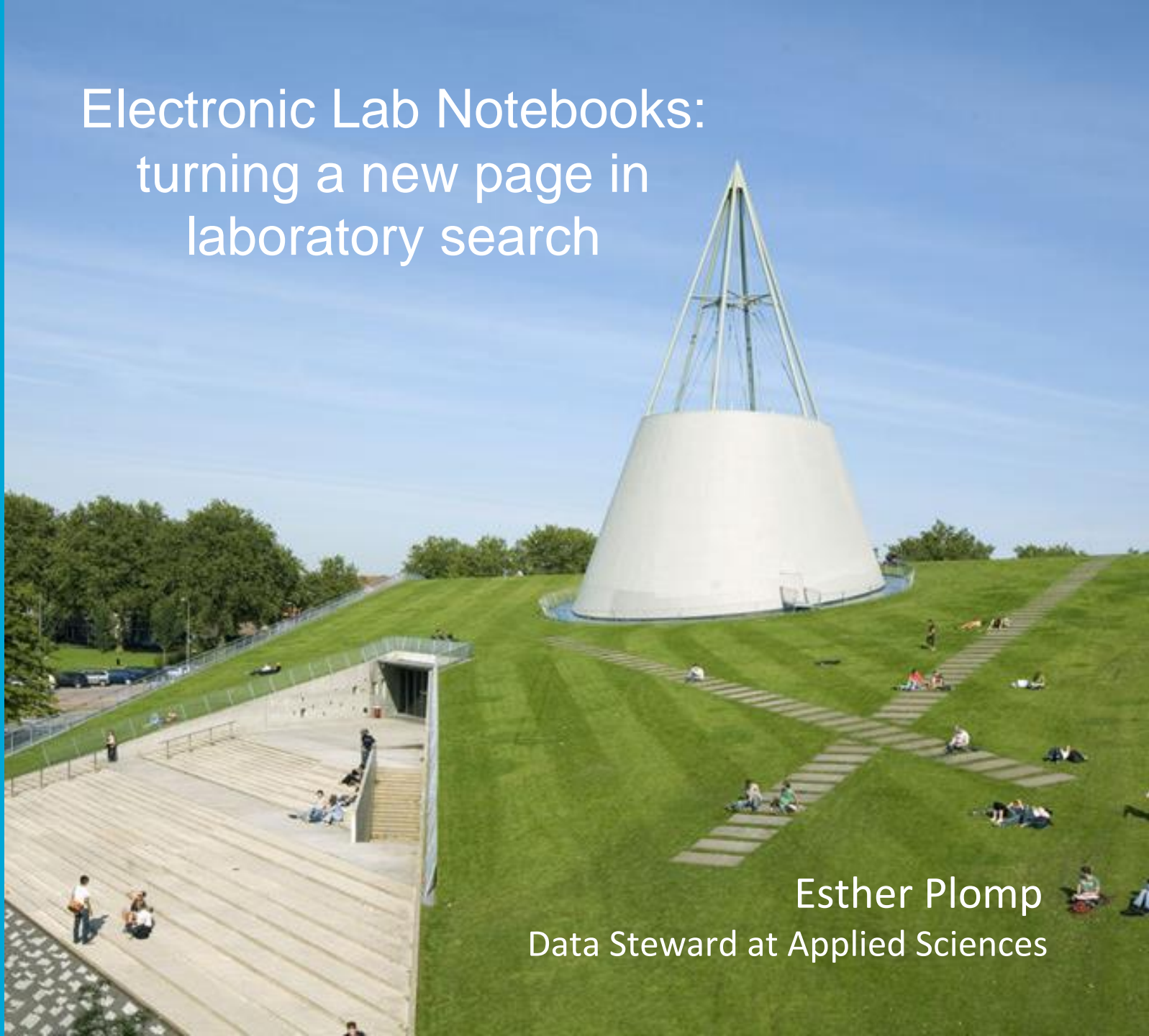


Electronic Lab Notebooks: turning a new page in laboratory search



<https://doi.org/10.5281/zenodo.2634449>

Data Stewards TU Delft

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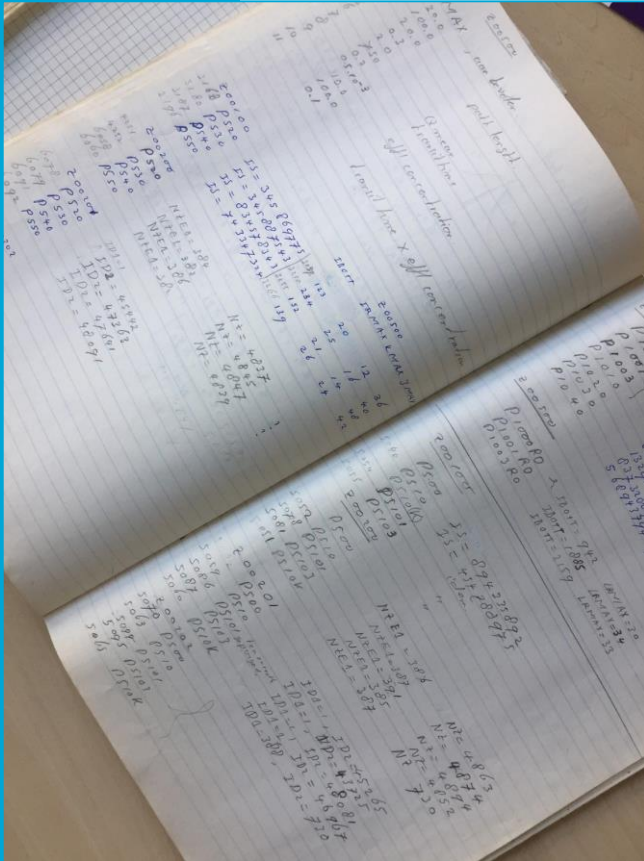
Menti.com 90 43 38
<http://tinyurl.com/2019ELN>

Outline of the workshop

- 13:00 – 13:45 Introduction + Naming convention + Questions
- 13:45 – 14:00 Setting up requirements
- 14:00 – 14:30 Compare requirements with products
- 14:30 – 15:00 Break + set up accounts
- 15:00 – 15:45 Try out
- 15:45 – 16:00 Wrap up

Lab notebooks

- Documentation of experiments
 - from hypothesis to results
 - crucial for reproducibility and reuse of research
- Discipline/Group/Individual specific



Why switch from paper to screen?



Katharina Hanika
[10.5281/zenodo.1204812](https://zenodo.org/doi/10.5281/zenodo.1204812)



Lenny Teytelman @lteytelman · 14 mrt.

For a lab notebook you use

Tweet vertalen

52% Paper

8% Evernote

20% Benchling

20% Other ELN (pls specify)

116 stemmen · Uitslag



Lenny Teytelman

@lteytelman

19:24 - 11 jan. 2016

For a lab notebook you use

29% Evernote

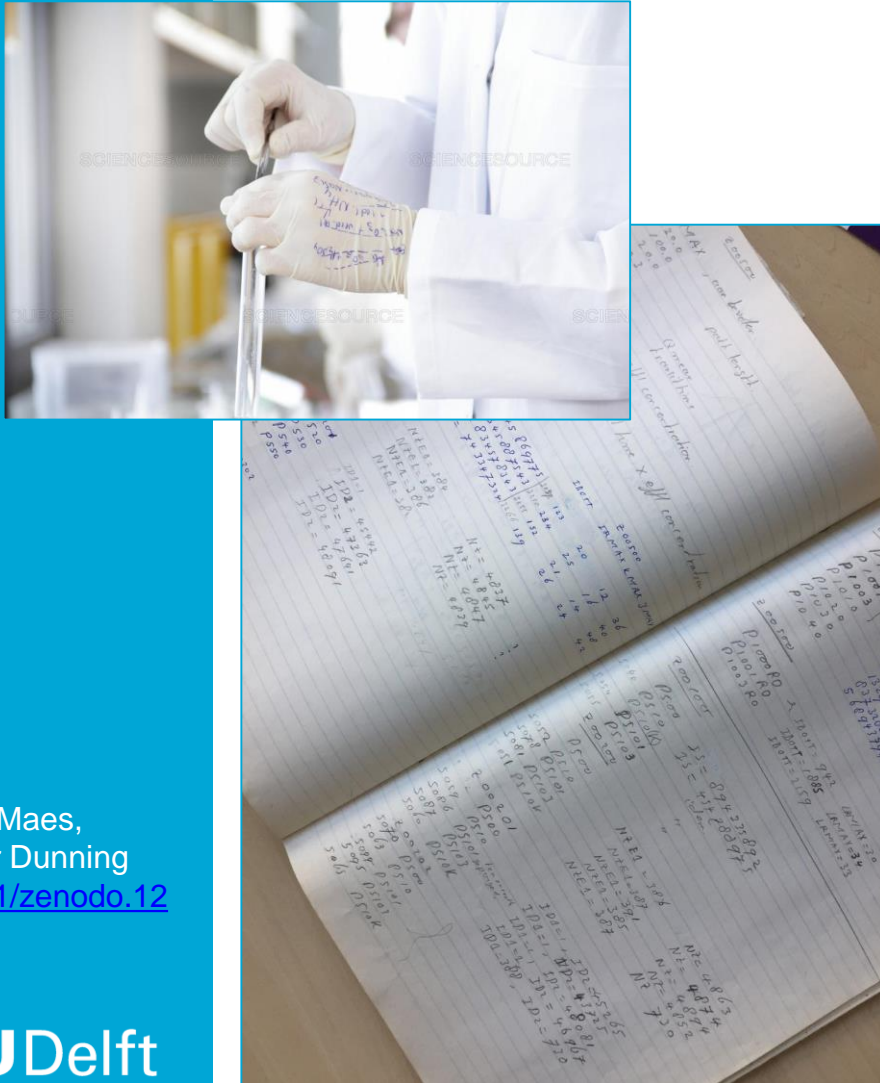
4% FindingsApp

9% OneNote

58% Paper

302 stemmen · Uitslag

Disadvantages paper notebooks

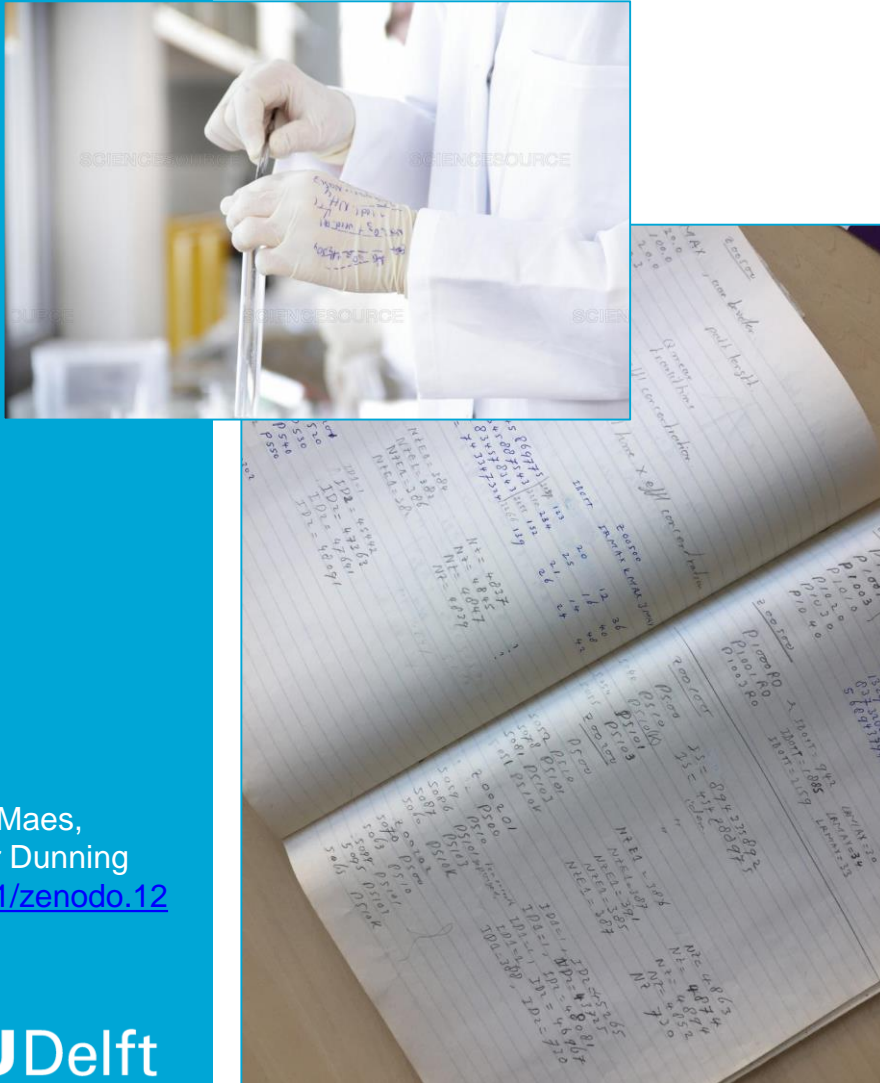


- Where is data/information stored?
- People leaving organisation with data/information



Data loss

Disadvantages paper notebooks



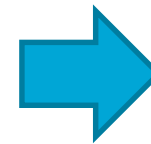
- **Not searchable**
- **Handwritten**
- **Not reusable**
- **No direct link to (digital) data**
- **Difficult to back-up**

➔ **decrease research efficiency/
reproducibility**

Advantages electronic notebooks



- **Searchable**
- **Readable**
- **Reusable**
- **Direct link to (digital) data**



**Increase research efficiency/
reproducibility**

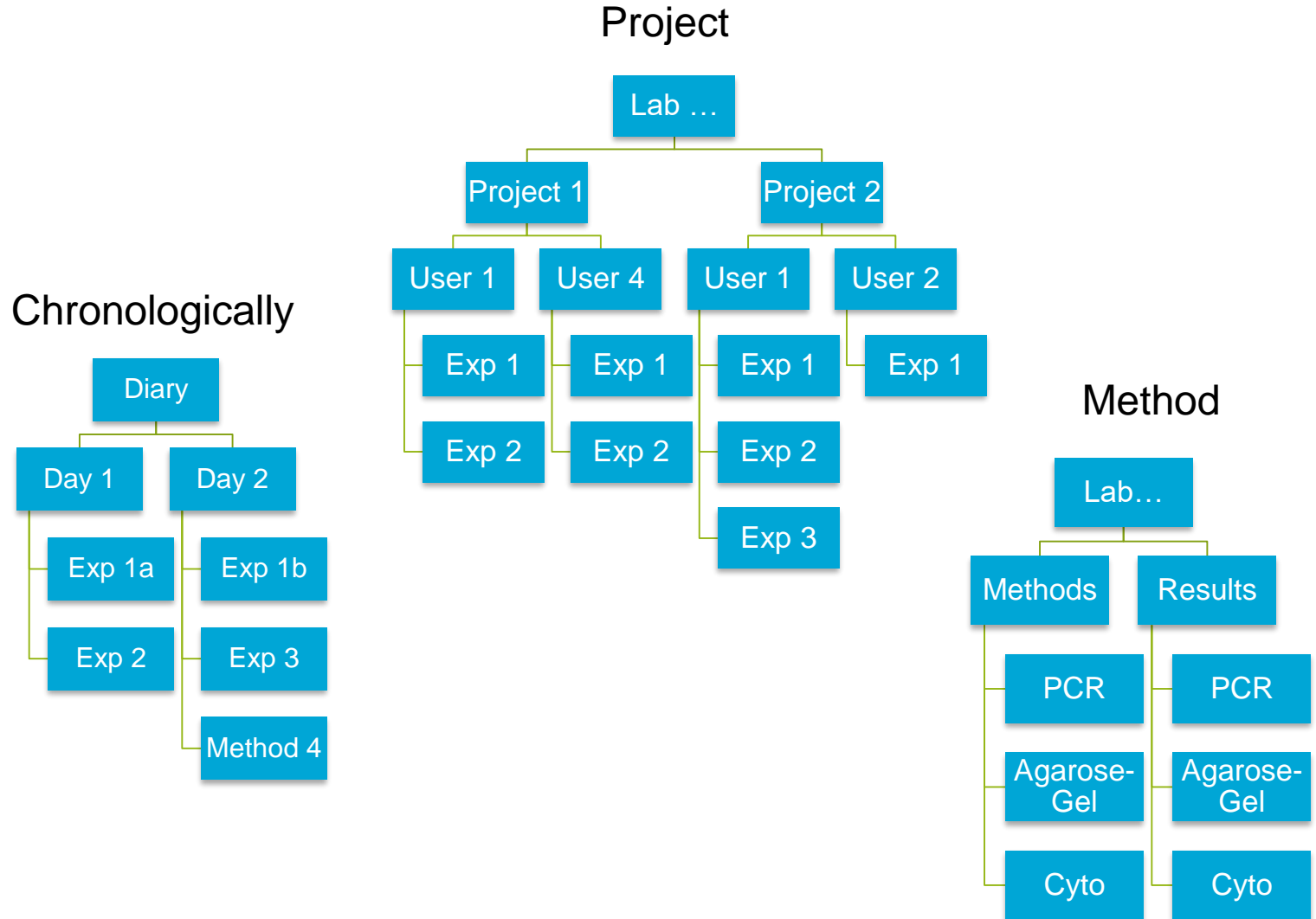


Electronic Lab Notebooks: Why?

- Readable and structured information
 - Easy collaboration with colleagues
 - Version control
- Digital storage (back up)
 - **Audit trail:** edits are logged and time-stamped (traceable and fraud proof)
- After implementation it is fast and easy to use, share and re-use content
 - Templates and protocols
- Well organised/structured
 - Overview of your experiments and projects
- Integration with other tools/software
 - Lab inventory, calendars, project management, archive, references, barcodes



Electronic Lab Notebooks: Why?



Electronic Lab Notebooks: Why?



F

- searchable
- metadata
- indexed

A

- well-defined (open) protocols
- authentication
- easy to share

I

- readable
- standardised (open) metadata
- structured file formats
- consistent vocabulary

R

- documentation

Electronic Lab Notebooks: Why?

- Open Science
 - collaborations
 - improving transparency/reproducibility
 - [Protocols.io](https://www.protocols.io)
 - increase of impact/trust of research for both science and society



**OPEN SCIENCE:
JUST
SCIENCE
DONE RIGHT**

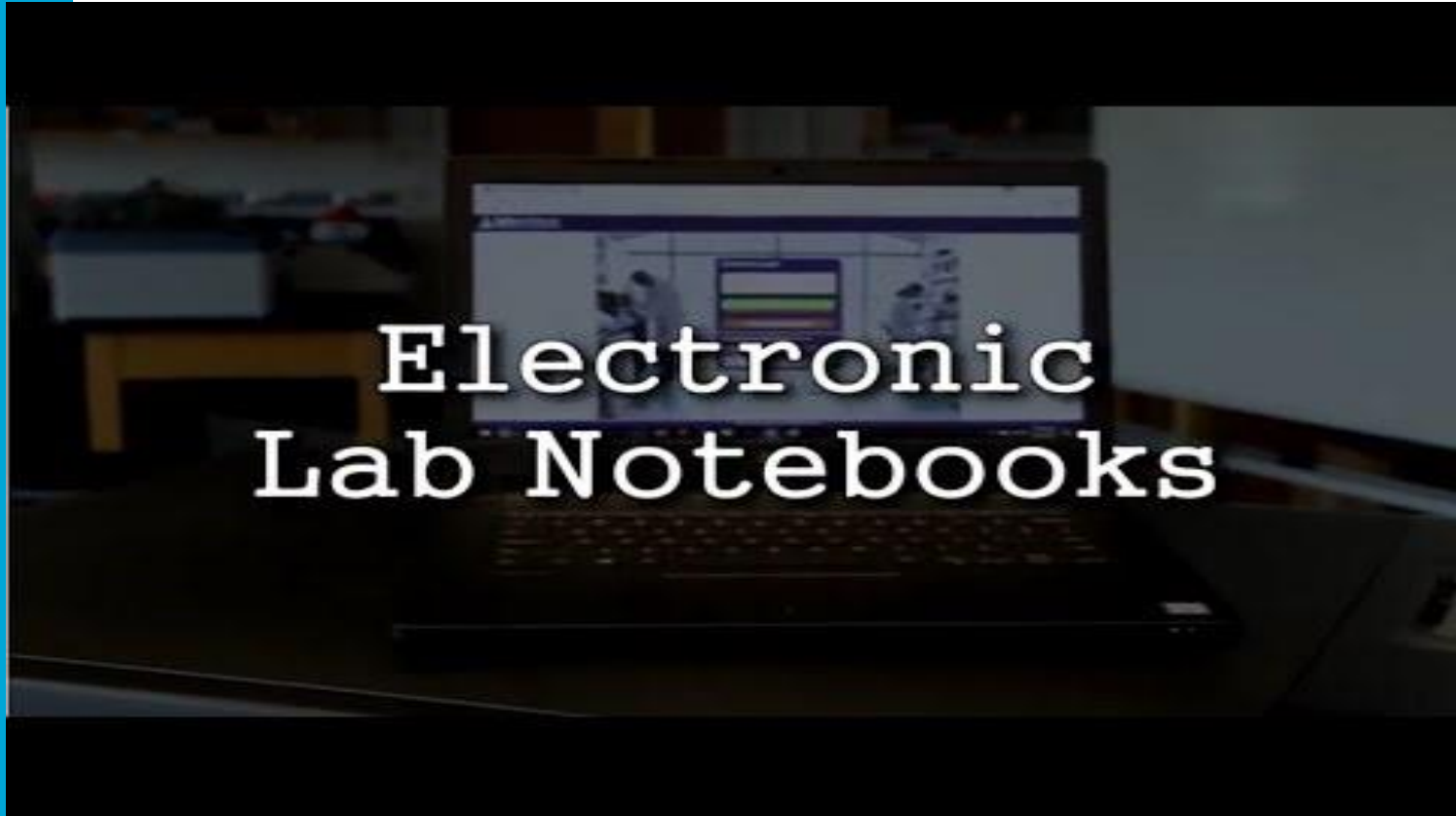
Electronic Lab Notebooks: Why?



ELNs can make your life easier!

Evelien Stouten
[10.5281/zenodo.1204812](https://doi.org/10.5281/zenodo.1204812)

Electronic Lab Notebooks: Why?



ELNs can make your life easier!

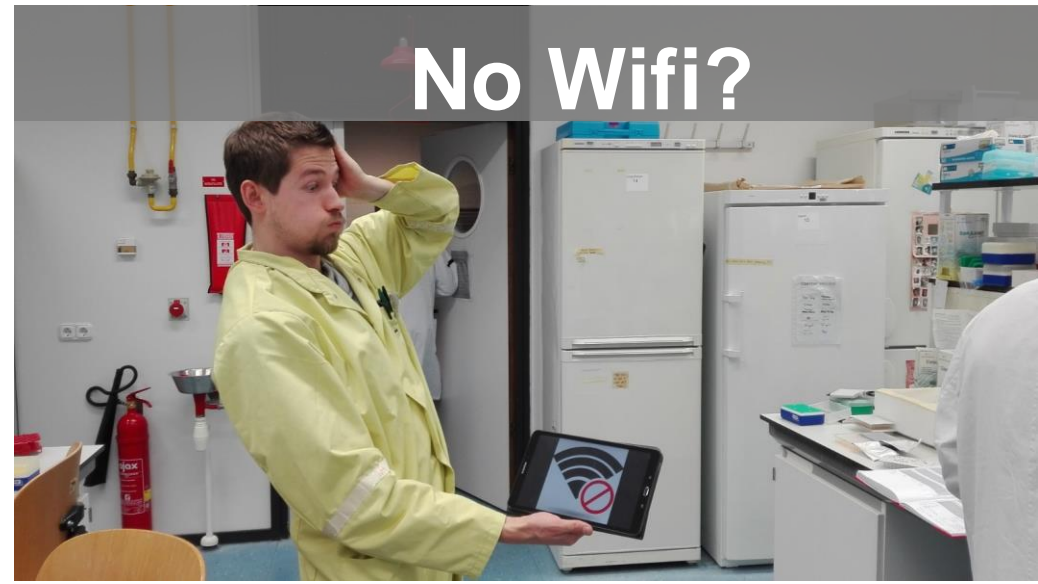
<https://www.youtube.com/watch?v=HktyUDcDU7o>

Electronic Lab Notebooks: Disadvantages

- ELN does not allow for **hand-written notes or drawings** (*upload pictures with device*)
- **Costs** (commercial products)
 - Free versions with reduced functionalities in number of users, storage space or file size
- **Export** format
 - .pdf is not interoperable
- **Open Source** ELN's
 - *No costs and better extractability of data*
 - Less features (e.g. [ELOG](#), [eLABFTW](#))
 - Requires community support/updates of software
 - *Customized for specific applications and innovation from community users*

Electronic Lab Notebooks: Disadvantages

- **Startup is time-intensive**
- **Good internet connection** may be required
- **Cloud based** (GDPR & confidential data)
- **Hardware**



Implementation

- Start with **online demonstrations** and **hands-on exercises**
- Assign the **experienced ELN users** as contact persons
- Creating an **ELN user group**
 - Slack/Whatsapp

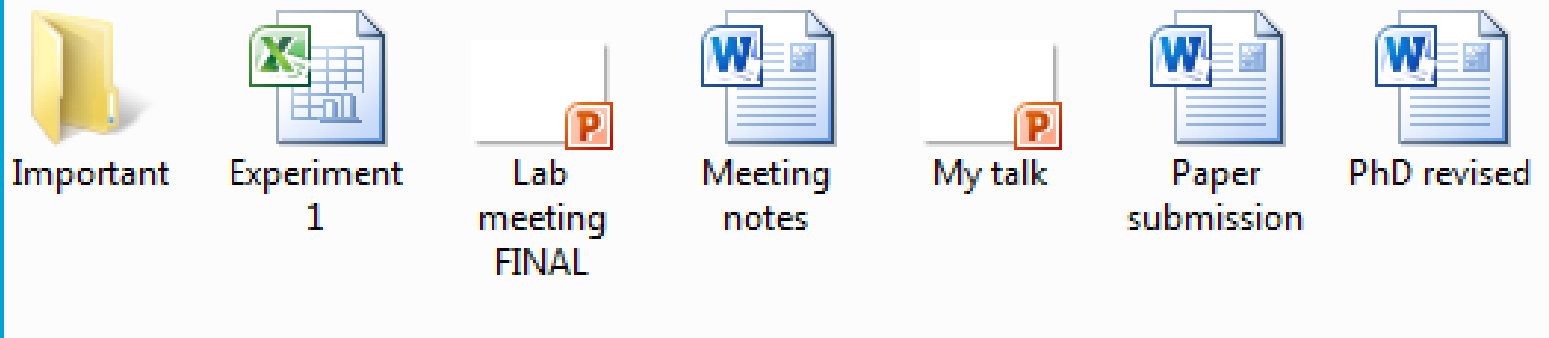
Universities with pilots

- TU Delft
 - ELN event [materials](#) and [blog](#)
- [Denmark](#) (DTU, Copenhagen and Aarhus)
 - Number of ELN's tested 1-3 tools
- [Glasgow](#)
- [Cambridge, The Gurdon Institute](#)
 - [OSF webinar](#)
- [Harvard Medical School](#)

Examples

- Huntington's disease with real-time experimental data
- Structural Genomics Consortium (SGC)
 - shared the laboratory notebooks of researchers from different SGC labs aiming at reducing duplication

Naming conventions



Would you know what you meant by this three years in the future?

- Date or date range of experiment: YYYYMMDD
- Version number of file
- File type
- Researcher name/initials
- Include a README.txt file to explain the naming convention

Naming conventions (10 min)

- Projects
 - Name, date, researcher initials
- Subfolders
- **Experiments**
 - YYYYMMDD
 - Type, Sample ID
- Samples
 - Origin, date of sampling
- Equipment
 - Name, model, number

Generic note taking tools



Basecamp



Confluence



asana



OneNote



GitHub



OneDrive



Evernote



Dropbox



ELN: What tool to use?



- 72 active products ([Kwok 2018](#))
 - Choose a company that is > 5 y old
- Team member might have different requirements and preferences



SignalsNotebook

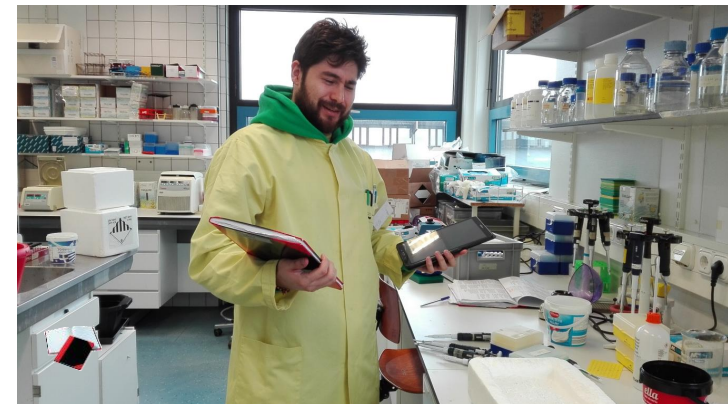


hivebench



ELN: What tool to use?

- Labfolder [guidance](#) and [scorecard](#)
- SciNote [guide](#) & [top 9](#)
- [Cambridge, The Gurdon Institute](#)
- [Harvard Medical School](#)
- [Labs Explorer 2019 review](#) + [ELN list](#)



Requirements

'must have', 'nice to have' and 'not needed'

- **Do you have a budget?**
 - Free or a paid ELN?
- **Individual or group use? Department or institute?**
 - Collaborative vs self-contained, accessibility?
- **Do you need team collaboration and supervisor features?**
 - Group activity dashboard, comments, notifications, sharing files, delegating tasks
 - Sufficient oversight and feedback tools? Team/account management?
- **Do you need multi-operating system (OS) compatibility?**
- **What devices will be used to operate the software?**
 - Tablets/laptop/phones? Voice recognition? Paper?
- **Storage**
 - Cloud or local?
 - GDPR compliance? Restricted access?

Requirements:

'must have', 'nice to have' and 'not needed'

- **Interface user friendly?**
 - Look and feel? Intuitive? Efficient? Comfortable?
- **Workflow suitability**
 - ELN workflow vs real workflow? Linear vs all-over-the-place?
- **Content creation tools**
 - Writing, drawing, annotation, mark-up, equations, chemical structures
- **Data management & storage feature?**
 - Upload typical file types/sizes? Display/operation? Backed-up?
- **Integration with other software and/or cloud services**
 - Office apps, Statistics, Institutional storage, repositories, Inventory
- **Audit trails**
 - Actions in the ELN are automatically time stamped
 - Patents
- **Export features**
 - Pages, Sections, Entire ELN? Original formats? Reports? Prints?

Requirements: Free

- [Labfolder](#)
- [LabArchives](#)
- [SciNote](#)
- [eLabFTW](#)
- [Findings](#) (iOS)
- [RSpace](#)
- [LabCloud](#)
- [Find Molecule](#)
- [OpenScience Framework](#)
- [Docollab](#)
- [Labstep](#)
- [Benchling](#)
- [Indigo ELN](#)
- [Chemotion](#)
- [Elog](#)
- [Labcollector](#)
- [Labspace](#)
- [OpenBIS](#)

Requirements: Open Source

- eLabFTW
- Open Science Framework
- Indigo ELN
- Chemotion
- Elog
- OpenBIS

Outline of the workshop

- 14:00 – 14:30 Compare requirements with products
- 14:30 – 15:00 Break + installation products
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<http://tinyurl.com/2019ELN>